Amendments to the Claims:

1.   (Original) A process for controlling a continuous gas phase exothermic process in a reactor comprising:

(i) effecting a gas phase exothermic reaction under a set of operating conditions in the presence of a cooling agent, the cooling agent having a concentration and a feed rate of an induced cooling agent;

(ii) determining a maximum production rate (I) without regard to limitations due to the cooling agent under the operating conditions;

(iii) determining a maximum production rate (II) with regard to limitations due to the cooling agent under the operating conditions;

(iv) calculating an optimal concentration of the induced cooling agent such that the difference between (I) and (II) is minimized; and

(v) adjusting the feed rate of the induced cooling agent to achieve the concentration value calculated in (iv)

wherein the cooling agent comprises reactants, inerts and the induced cooling agent.

2.   (Original) The process of claim 1, wherein the continuous gas phase exothermic process is an ethylene polymerization process or a propylene polymerization process.

3.   (Original) The process of claim 1, wherein the reactor is a fluidized bed reactor and comprises a reactor bed, a reactor outlet and a reactor inlet and the calculation of the optimal concentration of the induced cooling agent comprises:

(i) calculating a cycle gas mass enthalpy at the reactor outlet conditions;

(ii) calculating a total cycle gas inlet mass enthalpy at the reactor inlet conditions;

(iii) calculating a change in the cycle gas mass enthalpy across the reactor bed;

(iv) calculating a target cycle gas mass enthalpy change across the bed; and

(v) iteratively calculating the concentration of the induced cooling agent that produces a cycle gas mass enthalpy change across the bed substantially equal to the target cycle gas mass enthalpy change across the bed.

4.   (Original) The process of claim 1, wherein the operating conditions comprise an inlet temperature, a bed temperature, a reactor pressure, a cycle gas composition, and a weight percentage condensing of the reactor inlet stream.

5.   (Original) The process of claim 1, wherein the production rate is calculated from the following equation:

$$F_{resin} = \frac{Q_L + F_{Rxin} * H_{Rxino} - F_{vap} * H_{vap} - F_{liq} * H_{liq}}{\Delta H_{rxn}}$$

wherein F_{resin} is resin production, Q_L is heat loss to atmosphere, F_{Rxin} is reactor inlet flow, H_{Rxino} is reference enthalpy of reactor inlet flow, F_{vap} is vapor flow to reactor, H_{vap} is enthalpy of vapor feed to reactor, F_{liq} is liquid flow to reactor, H_{liq} is enthalpy of liquid feed to reactor, and ΔH_{rxn} is heat of reaction.

6.   (Original) The process of claim 3, wherein the cycle gas mass enthalpy of the reactor at outlet conditions is calculated by the following equation:

$$H_{bed} = H^{o}_{vap} / wtmol_g$$

wherein, H_{bed} is the cycle gas mass enthalpy at reactor outlet conditions, H^o_{vap} is the vapor

molar enthalpy of the cycle gas at the reactor outlet conditions, and $wtmol_g$ is the average molecular

weight of the gas.

7.   (Original) The process of claim 3, wherein the total cycle gas mass enthalpy at the

reactor inlet is calculated by the following equations:

a. $HC_{vap} = H^i_{vap} / wtmol_g$

b. $HC_{liq} = H_{liq} / wtmol_l$

c. $H_{vl} = Wt_{cnd} * HC_{liq} + (1 - Wt_{cnd}) * HC_{vap}$

wherein HC_{vap} is the vapor cycle gas mass enthalpy at reactor inlet conditions, H^i_{vap} is the

vapor molar enthalpy of the cycle gas at reactor inlet conditions, $wtmol_g$ is the average molecular

weight of the cycle gas, HC_{liq} is the liquid mass enthalpy of the cycle gas at reactor inlet conditions,

H_{liq} is the liquid molar enthalpy of the cycle gas at reactor inlet conditions, $wtmol_l$ is the average

molecular weight of the liquid, H_{vl} is the total inlet mass enthalpy, and Wt_{cnd} is the weight fraction of

the condensed cycle gas at the reactor inlet.

8.   (Original) The process of claim 3, wherein the change in the cycle gas mass enthalpy

across the reactor bed is calculated by the following equation:

$H = H_{bed} - H_{vl}$

wherein, H is the change in the cycle gas mass enthalpy across the bed, H_{bed} is the cycle gas

mass enthalpy at reactor outlet conditions, and H_{vl} is the total cycle gas mass enthalpy at reactor inlet

conditions.

9.   (Original) The process of claim 3, wherein the target cycle gas mass enthalpy change across the bed is calculated by the following equation:

$$H_{target} = H * PR_{nlc} / PR_{lc}$$

wherein H_{target} is the target cycle gas mass enthalpy change across the bed, H is the change in cycle gas mass enthalpy change across the bed, PR_{nlc} is the production rate not limited by the cooling agent concentration, and PR_{lc} is the production rate that is limited by the cooling agent concentration.

10.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the induced cooling agent is a liquid saturated hydrocarbon containing 3 to 7 carbon atoms or polymerizable condensable comonomers.

11.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the induced cooling agent is isopentane.

12.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the induced cooling agent is hexane.

13.   (Original) The process of claim 3, wherein the iterative calculation of the concentration is achieved by a bisection method, a Newton method, a secant method, or a regula falsi method.

14.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the induced cooling agent is a gas inert to the process.

15.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the induced cooling agent is an induced condensing agent.

16.   (Original) The process of claim 15, wherein the induced condensing agent is a saturated hydrocarbon containing 3 to 7 carbon atoms.

17.   (Original) The process of claim 16, wherein the induced condensing agent is isopentane.

18.   (Original) The process of claim 16, wherein the induced condensing agent is hexane.

19.   (Original) The process of claim 2, wherein ethylene and at least one alpha-olefin are polymerized.

20.   (Original) The process of claim 2, wherein ethylene is polymerized.

21.   (Original) The process of claim 19, wherein the alpha-olefin comprises one or more C_3-C_{12} alpha-olefins.

22.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the induced cooling agent is non-condensable.

23.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the reactants, the inerts, and the induced cooling agent are all condensing.

24.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the reactants, the inerts, and the induced cooling agent all are not condensing.

25.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the reactants are condensing but the inerts and the induced cooling agent are not condensing.

26.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the reactants and the inerts are condensing and the induced cooling agents are not condensing.

27.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the reactants and the induced cooling agent are not condensing and the inerts are condensing

28.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the reactants and the induced cooling agent are condensing and the inerts are not condensing.

29.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the inerts and the induced cooling agent are condensing and the reactants are not condensing.

30.   (Currently Amended) The process of claim 1, 2, 3, 4, or 5, wherein the induced cooling agent is condensing but the reactants and the inerts are not condensing.